

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte JONG BERTHOLD and SIEGFRIED SCHWARZL

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Appeal No. 2005-0463  
Application 09/595,860

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ON BRIEF

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Before GARRIS, WARREN, and PAWLIKOWSKI, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal which involves claims 1-23 and 27.

The subject matter on appeal relates to an integrated electrical circuit. With exemplificative reference to Figure 1 of the appellants' drawing, the circuit comprises at least one element structure plane (10), electrically active elements (e.g.,

20) on the element structure plane, a first insulation layer (150) disposed above the element structure plane and having first contact holes (e.g., 170) disposed therein and filled with a metal, a second insulation layer (320) disposed above the first insulation layer and having second contact holes (e.g., 330) disposed therein and filled with electrical connecting leads and further filled with copper in a whole-area manner, connection pieces (e.g., 250) disposed underneath the electrical connecting leads and above the first contact holes, a diffusion blocker (160) disposed underneath the electrical connecting leads which impedes and prevents a diffusion of copper and is interrupted only in a region having the first contact holes formed therein and is disposed between the first insulation layer and the second insulation layer, and the connection pieces being made of aluminum and covering the first contact holes and contacting the connection leads wherein the connection pieces are covered by the second insulation layer. This appealed subject matter is adequately illustrated by independent claim 1, which reads as follows:

1. An integrated electrical circuit, comprising:

a plurality of structure planes including at least one element structure plane;

electrically active elements disposed on said at least one element structure plane;

a first insulation layer disposed above said at least one element structure plane;

said first insulation layer having first contact holes disposed therein, and said first contact holes being filled with a metal;

a second insulation layer disposed above said first insulation layer;

said second insulation layer having second contact holes disposed therein and filled with electrical connecting leads, and said second contact holes being further filled with copper in a whole-area manner;

connection pieces disposed underneath said electrical connecting leads and above said first contact holes;

at least one diffusion blocker disposed underneath said electrical connecting leads, said diffusion blocker at least one of impeding and preventing a diffusion of copper, said diffusion blocker configured as a blocker layer interrupted only in a region having said first contact holes formed therein, said blocker layer disposed between said first insulation layer and said second insulation layer; and

said connection pieces being made of aluminum and covering said first contact holes and contacting said connection leads, and said connection pieces being covered by said second insulation layer.

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The references set forth below are relied upon by the examiner as evidence of obviousness:

McCollum et al. (McCollum)	5,552,627	Sep. 3, 1996
Cohen et al. (Cohen)	5,679,269	Oct. 21, 1997
Chiang et al. (Chiang)	5,739,579	Apr. 14, 1998
Bothra et al. (Bothra)	5,798,559	Aug. 25, 1998
Cheek et al. (Cheek)	5,935,766	Aug. 10, 1999
Hong et al. (Hong)	6,008,117	Dec. 28, 1999

Claims 1-7, 18-23 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cheek in view of Cohen, and further in view of Bothra.

The following § 103 rejections also have been advanced on this appeal:<sup>1</sup>

Claims 8, 9 and 14-16 are rejected as being unpatentable over Cheek, Cohen and Bothra, and further in view of Chang;

Claims 12 and 13 are rejected as being unpatentable over Cheek, Cohen and Bothra, and further in view of Hong; and

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<sup>1</sup>The application file record reflects that the examiner considers dependent claim 17 to be under rejection. Nevertheless, by an apparently inadvertent oversight, the examiner has failed to list this claim in any of the rejections set forth in the Answer or in the final Office action. Particularly in light of our disposition of the subject appeal, this apparent oversight by the examiner is harmless.

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Claims 10 and 11 are rejected as being unpatentable over Cheek, Cohen and Bothra, and further in view of McCollum.

We refer to the Brief and Reply Brief and to the Answer for a thorough exposition of the opposing viewpoints expressed by the appellants and by the examiner concerning the above-noted rejections.

#### OPINION

For the reasons which follow, these rejections cannot be sustained.

In rejecting claim 1, the sole independent claim on appeal, the examiner acknowledges that the claim distinguishes over Cheek in the manner set forth below:

Cheek . . . does not teach that at least one diffusion blocker layer formed between first and second insulation layers and underneath the electrical connecting leads, wherein the diffusion blocker is interrupted only in a region having first contact holes and the connection pieces covering the contact hole. Cheek . . . also does not teach that the second contact holes are filled with copper in a whole-area manner.  
[Answer, page 4]

Notwithstanding these claim distinctions, the examiner reaches a conclusion of obviousness for the reasons which follow:

It would have been obvious to one of ordinary skill in the art to fill the second contact holes of [sic, with] Cu instead of W as taught by Cohen . . . in Cheek['s] . . . device because Cu and W are art recognized material for filling the contact holes in the semi- conductor integrated circuit and they are interchangeable. It also would have been obvious to one of ordinary skill in the art to incorporate the silicon nitride blocker layer as taught by Bothra . . . into Cheek['s] . . . device in order to prevent the moisture that [may] cause corrosion or contaminants to reach the semiconductor substrate. See Bothra['s] . . . col. 4 lines 52-60. [Answer, page 4]

Like the appellants, we do not believe that one having ordinary skill in this art would have been motivated "to incorporate the silicon nitride blocker layer as taught by Bothra . . . into Cheek['s] . . . device in order to prevent the moisture that [may] cause corrosion or contaminants to reach the semiconductor substrate." Id. In this regard, we recognize that Bothra teaches in lines 52-60 of column 4 that his silicon nitride passivation layer 116 "is intended to provide a protective barrier to moisture that may cause corrosion or contaminants to reach silicon substrate 100" (column 4, lines 55-57). We agree with the appellants, however, that the device of Cheek has no apparent need for "a protective barrier to moisture" (Id., at line 56).

That is, while the circuit preparation process of Bothra involves wet etching techniques (see lines 3-11 in column 6 and lines 32-42 in column 8) which create the potential for moisture corrosion or contamination problems, the examiner points to nothing and we find nothing independently in the disclosure of Cheek which teaches or suggests that moisture would be created and therefore could cause the afore-noted problems in Cheek's circuit preparation process. Concerning this point, we emphasize that Cheek employs an ion etching technique (e.g., see line 5 in column 6; line 65 in column 6; line 50 in column 7; and line 13 in column 8) rather than the wet etching technique of Bothra.

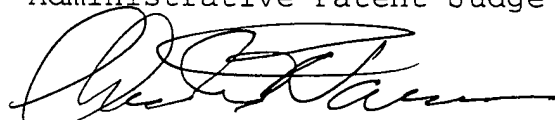
In short, the record before us does not support the examiner's proposed combination of the Cheek and Bothra teachings because the Cheek device does not appear to suffer from the problems solved by the silicon nitride passivation layer of Bothra. For this reason, we cannot sustain the examiner's § 103 rejection of appealed independent claim 1 or correspondingly any of the § 103 rejections of the dependent claims on appeal.

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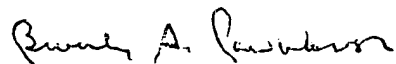
The decision of the examiner is reversed.

REVERSED

  
BRADLEY R. GARRIS )  
Administrative Patent Judge )

  
CHARLES F. WARREN )  
Administrative Patent Judge )

BOARD OF PATENT  
APPEALS AND  
INTERFERENCES

  
BEVERLY A. PAWLIKOWSKI )  
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